a. Nitrogen – most likely on acid soils.
   1. Dwarfing of plant.
   2. Leaves tend to assume an erect position, forming a rather acute angle with the stalk.
   3. Plant abnormally light green.
   4. More or less firing of lower leaves.

b. Phosphorous – most likely on acid soils.
   1. Dwarfing of plant.
   2. Plant abnormally dark green.
   3. Little or no firing.
   4. Leaves are unusually narrow in proportion to length.

2. Local effects on older leaves.

c. Potassium
   1. Chlorotic (loss of green color) areas are yellowish and produce a mottled effect first at the tips and margins of the leaves and between the veins.
   2. Early symptom is a crimping under or cupping downward of the lower leaves at the tips and margins.
   3. Advanced stages – small dead spots at tips and margins while other parts of the plant are bluish green.

d. Magnesium (Epsom Salts) – on acid soils.
   1. Chlorotic areas are light green to almost white or sometimes red, occuring between the principal veins, not primarily at the tips and margins.
   2. Little or no dead tissues.
   3. Leaves become brittle and may or may not cup upward.
   4. Plant becomes more susceptible to cold injury.
   5. Leaves fall.

e. Zinc – most likely on alkaline soils.
   1. Dead spots develop all over the leaf.
   2. Leaves thick.
   3. Stalks with short internodes.
   4. Leaves small, producing rosettes of leaves.
   5. Leaves fall.

f. Molybdenum
   1. Mottling of older leaves with veins remaining light green.
   2. New leaves green at first but become mottled upon expansion.
   3. Advanced stages–puffing of chlorotic areas.

B. Effects on new growth of plant.

1. Effect on new leaves without dieback.

g. Iron – most likely on alkaline soils.
   1. Chlorosis between principal vein.
   2. Veins remain green.
   3. Extreme effect the leaf becomes pale yellow to white with no dead areas.

h. Sulphur – most likely on acid soils.
   1. Veins as well as the entire leaf tend to be light green to yellow-green.
   2. Veins may be lighter than the leaf tissue.
   3. Crimping downward of the leaves at the tips.
   4. Plant dwarfed.

i. Manganese – usually on alkaline soils.
   1. The entire vein system retains its green color in sharp contrast to the pale tissue between the veins.
   2. Dead spots develop.